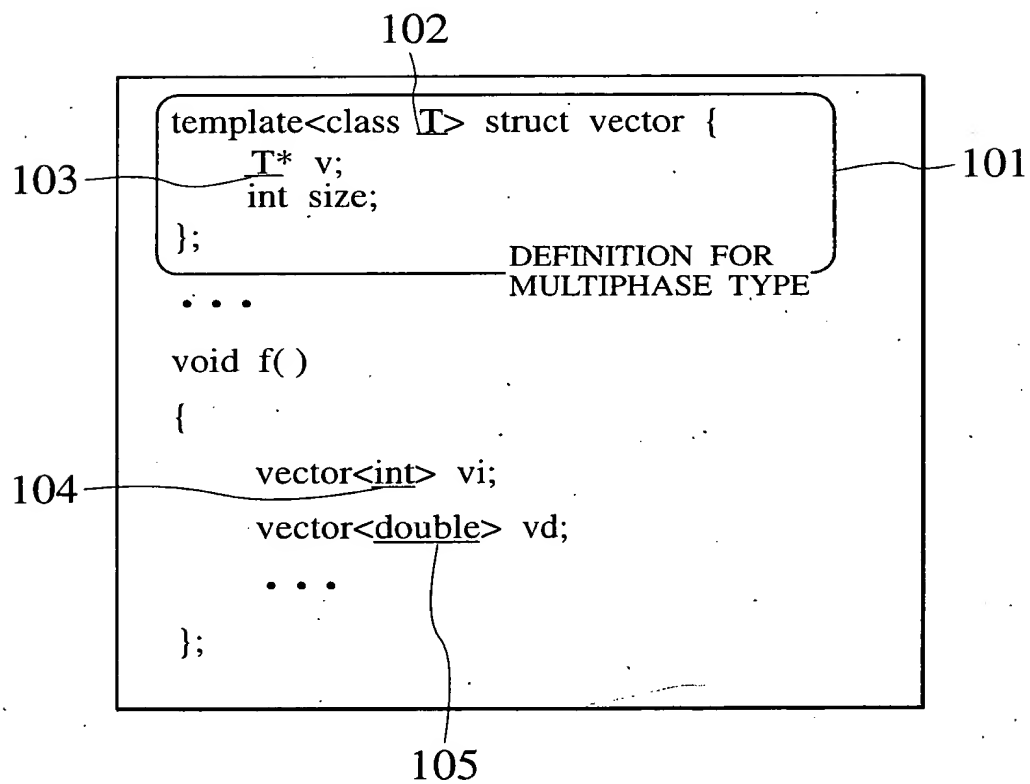


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# FIG. 1

## PRIOR ART

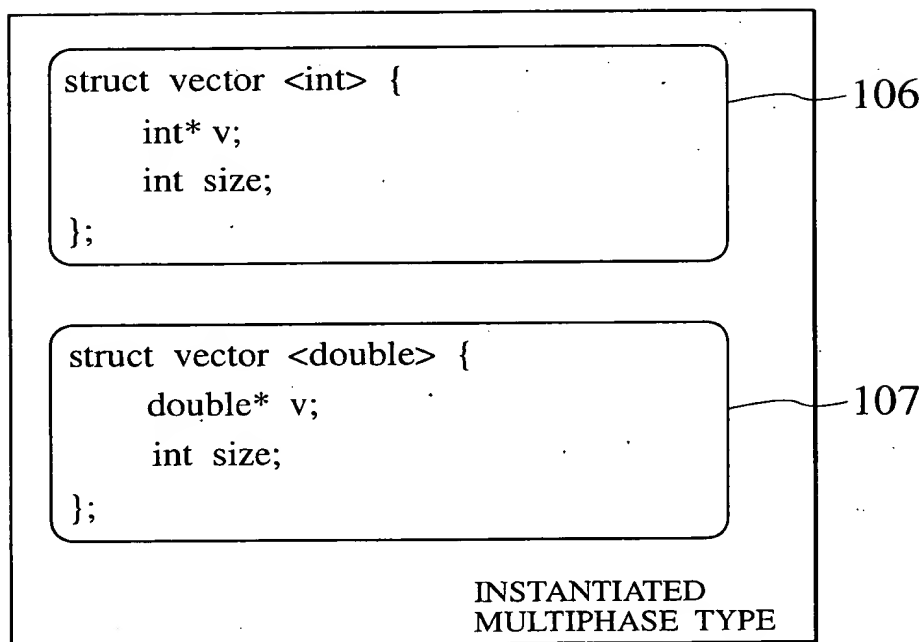


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# FIG. 2

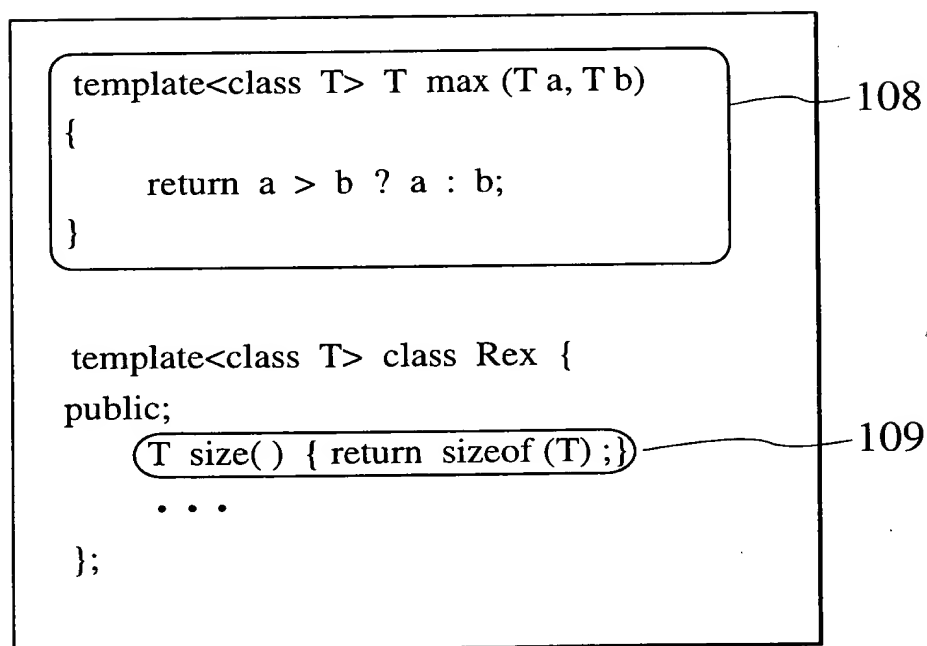
PRIOR ART



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FIG. 3

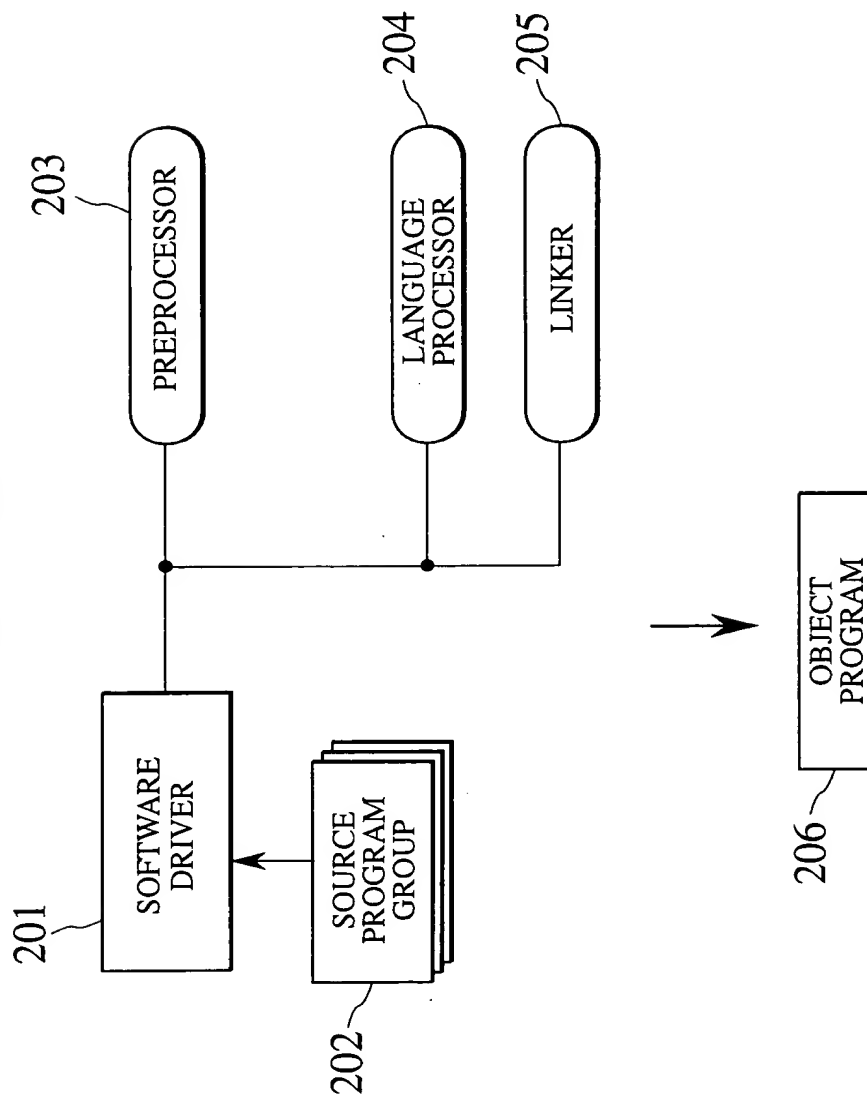


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FIG. 4

PRIOR ART



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FIG. 5  
 PRIOR ART

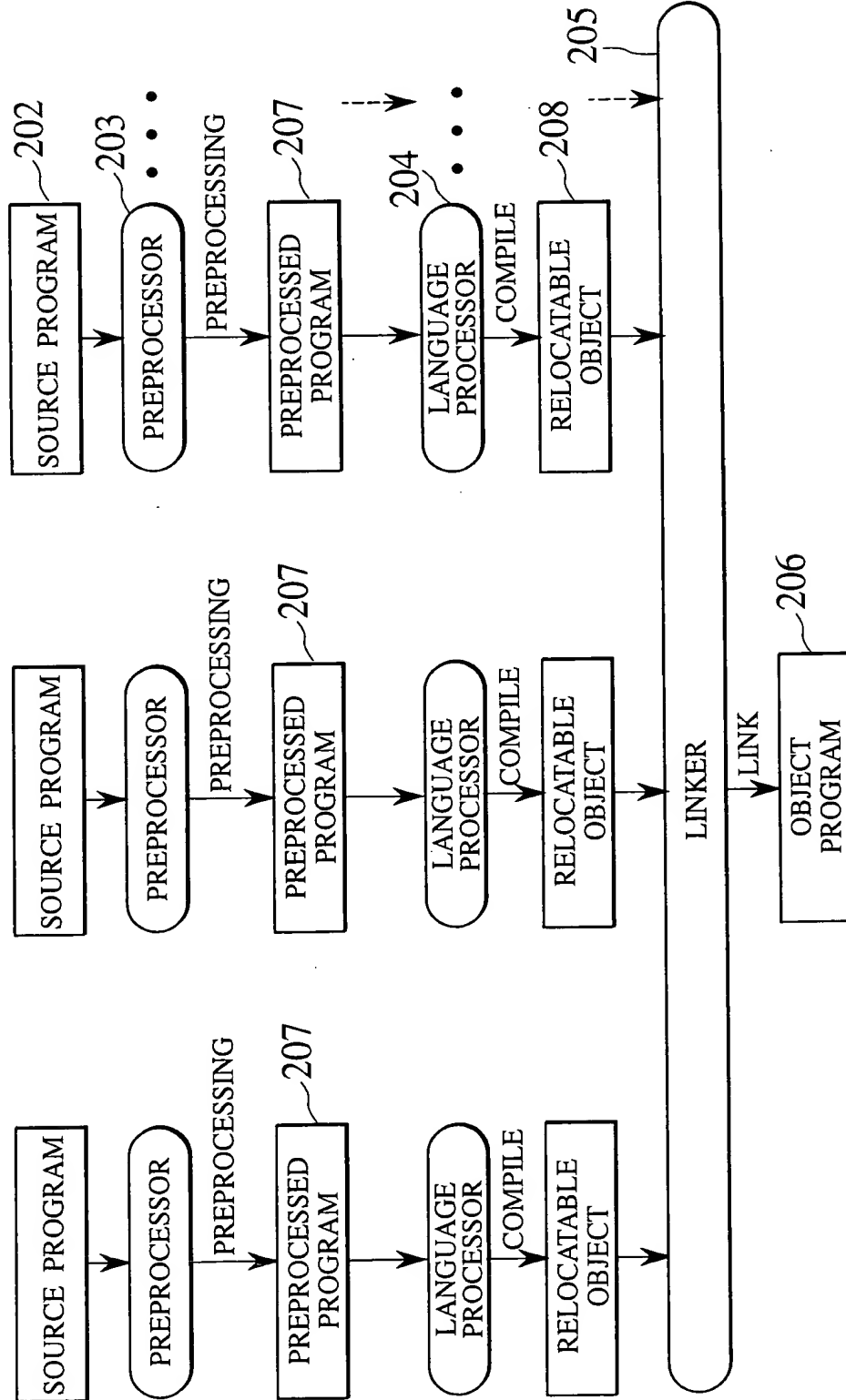


FIG. 6A

```
template<class T> struct vector {  
    T* v;  
    int size;  
};  
sample.h
```

```
#include "sample.h"  
...  
void f()  
{  
    vector<int> vi;  
    ...  
}  
...
```

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FIG. 6B

```
struct vector_int {  
    int* v;  
    int size;  
}  
...  
void f()  
{  
    vector_int vi;  
    ...  
}  
...
```

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FIG. 7A

DECLARATION FILE (HEADER FILE)  
 FOR MULTIPHASE TYPE

Stack.h

```
template<class T> class Stack {
    T* v;
    T* p;
    int size;
public:
    Stack(int);
    ~Stack( );
    void push(T);
    T pop( );
};
```

FIG. 7B

DEFINITION FILE FOR MULTIPHASE TYPE

313

Stack.cpp

```
#include "stack.h"
template<class T> Stack<T>::Stack(int s)
{
    v = p = new T[size - s];
}
template<class T> Stack<T>::~~ Stack( )
{
    delete[ ] v;
}
template<class T> void Stack<T>::push(T a)
{
    *p++ = a;
}
template<class T> T Stack<T>P::pop( )
{
    return *--p;
}
```

FIG. 7C

SOURCE FILE USING  
 MULTIPHASE TYPE

314

315

file.cpp

```
#include "stack.h"
void func( )
{
    Stack<int> s;
    . . .
}
. . .
```

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FIG. 8A

DECLARATION FILE FOR  
MULTIPHASE TYPE

Stack.h

```
template<class T> class Stack {
    T* v;
    T* p;
    int size;
public:
    Stack(int);
    ~Stack( );
    void push(T);
    T pop( );
};
```

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```
template<class T> Stack<T>:: Stack(int s)
{
    v = p - new T[size - s];
}
template<class T> Stack<T>::~~ Stack( )
{
    delete[ ] v;
}
template<class T> void Stack<T>::push(T a)
{
    *p++ = a;
}
template<class T> T Stack<T>::pop( )
{
    return *--p;
}
```

FIG. 8B

SOURCE FILE USING  
MULTIPHASE TYPE

317

#include "stack.h"

void func( )

318

Stack&lt;int&gt; s;

...

file.cpp

}

...

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FIG. 9A DECLARATION FILE (HEADER FILE)  
FOR MULTIPHASE TYPE

Stack.h

```
template<class T> class Stack {
    T* v;
    T* p;
    int size;
public:
    Stack(int);
    ~Stack( );
    void push(T);
    T pop( );
};
```

FIG. 9B DEFINITION FILE FOR  
MULTIPHASE TYPE

319  
Stack.cpp

```
#include "stack.h"
template<class T> Stack<T>::Stack(int s)
{
    v = p - new T[size - s];
}
template<class T> Stack<T>::~Stack( )
{
    delete [ ] v;
}
template<class T> void Stack<T>::push(T a)
{
    *p++ = a;
}
template<class T> T Stack<T>P::pop( )
{
    return *--p;
}
```

FIG. 9C SOURCE FILE USING  
MULTIPHASE TYPE

318  
file.cpp

```
#include "stack.h"
void func( )
{
    Stack<int> s;
    . . .
}
. . .
```

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FIG. 10

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```
template<class T> class Stream {  
public;  
  
    T & add_info(T&);  
  
    void add_list (T&, int);  
  
    void add_cell (T&);  
  
    void add_alist (T&, int);  
  
    . . .  
  
};
```

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FIG. 11

a,h — 

```
template<class T> T max(T a,T b)
{
    return a > b ? a : b;
}
```

f1.cpp — 

```
#include "a,h"
void func 1 ( )
{
    ...
    322 — i=max<int> (1, 3);
    ...
}

void func 2 ( )
{
    323 — j=max<int> (4, 3);
    ...
}
```

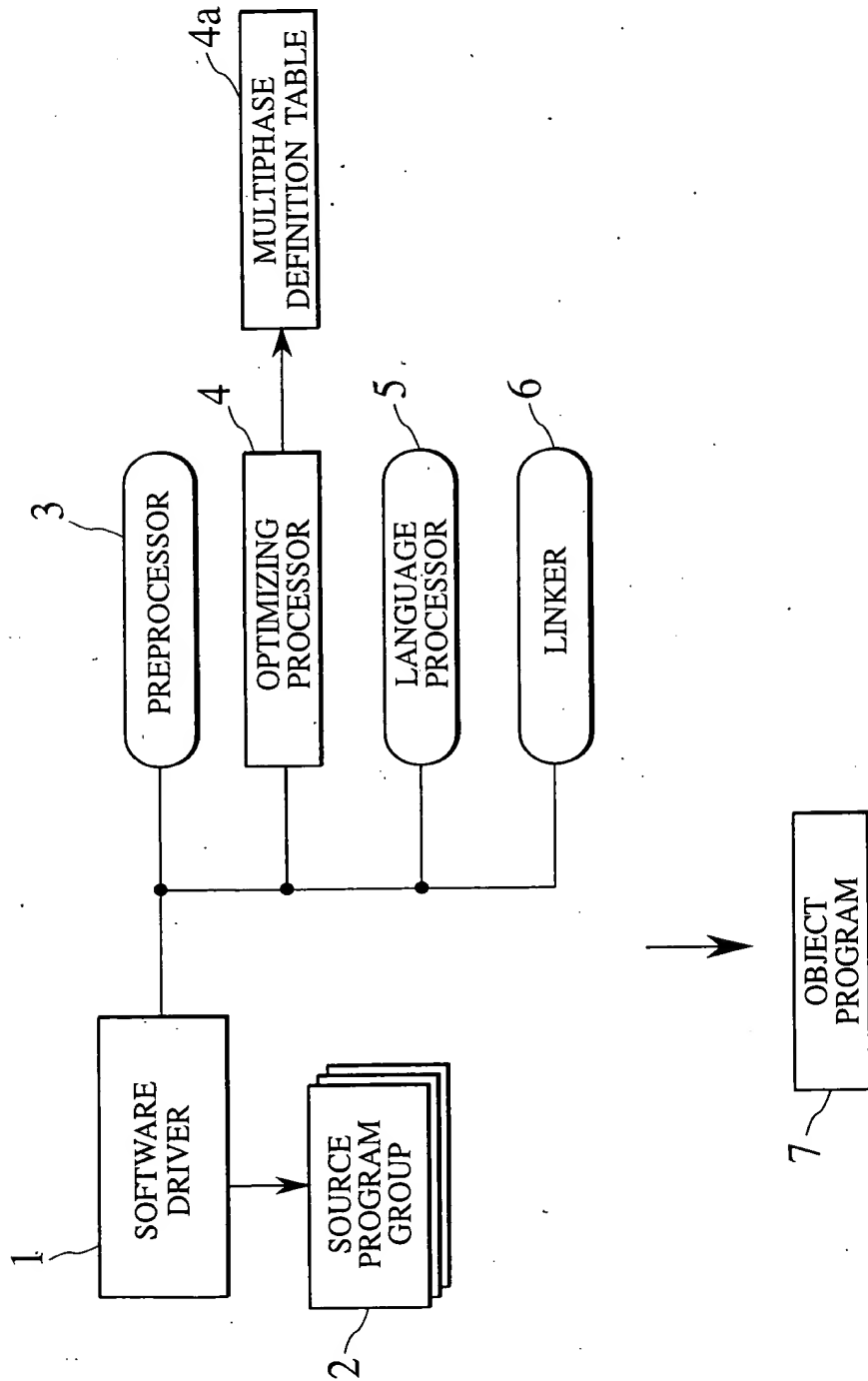
f2.cpp — 

```
#include "a,h"
void func 3 ( )
{
    324 — k=max<int> (1, 10);
    ...
}
```

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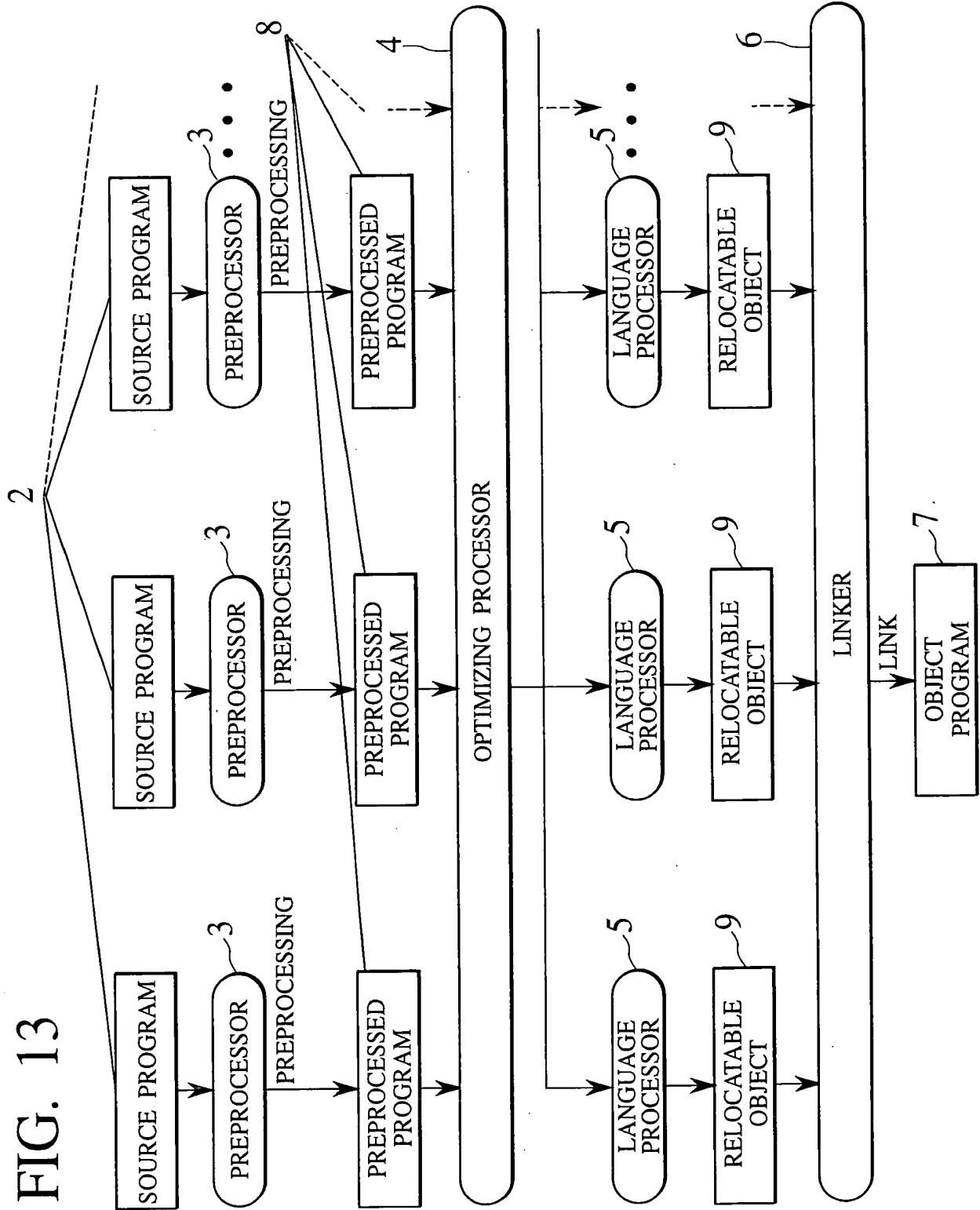
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FIG. 12



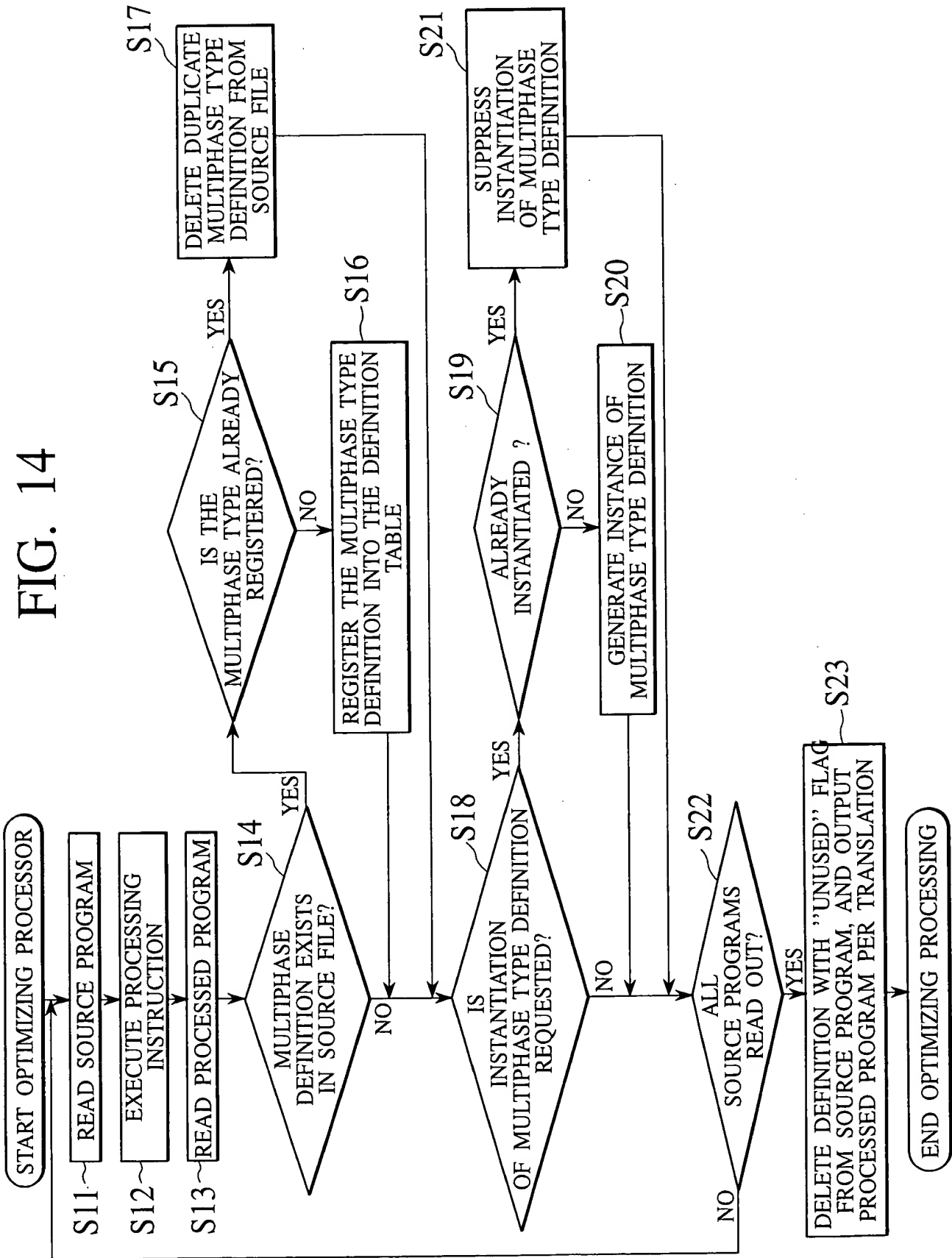
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FIG. 13



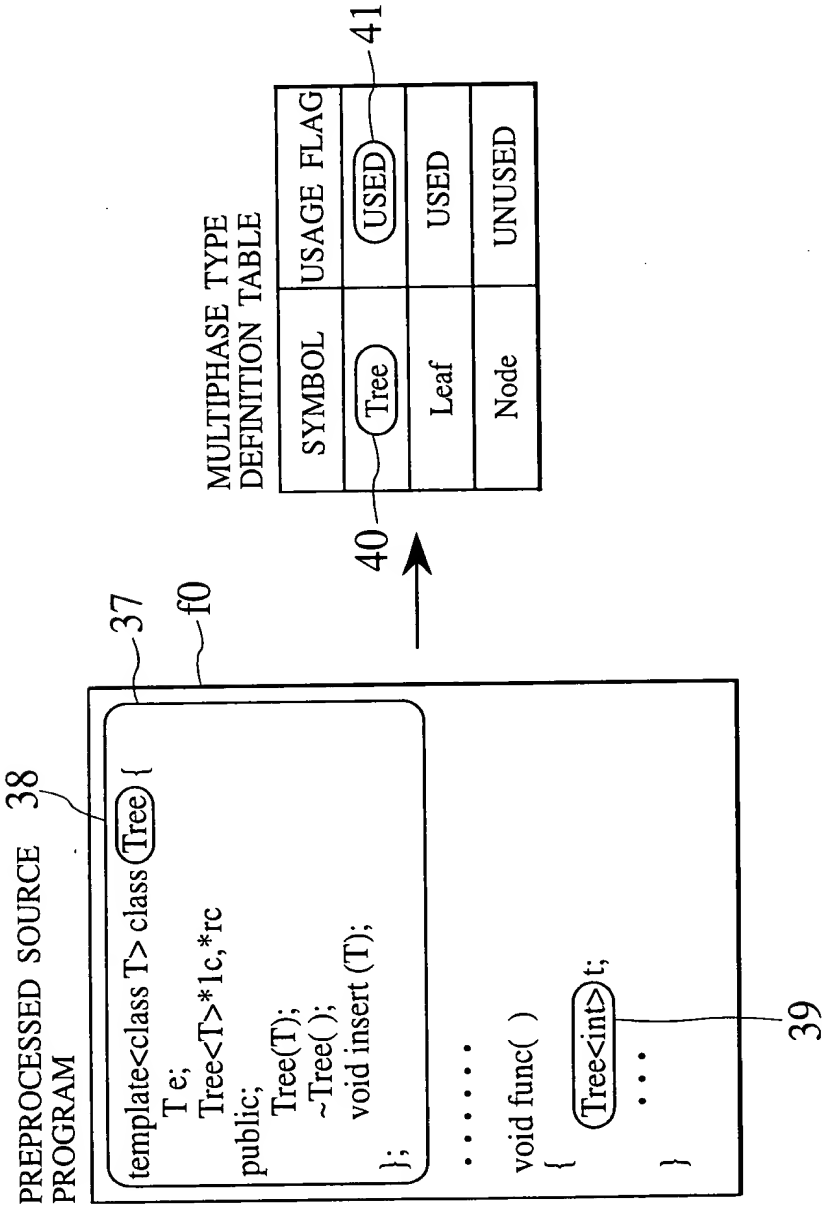
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FIG. 14



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FIG. 15



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FIG. 16A

PREPROCESSED SOURCE PROGRAM

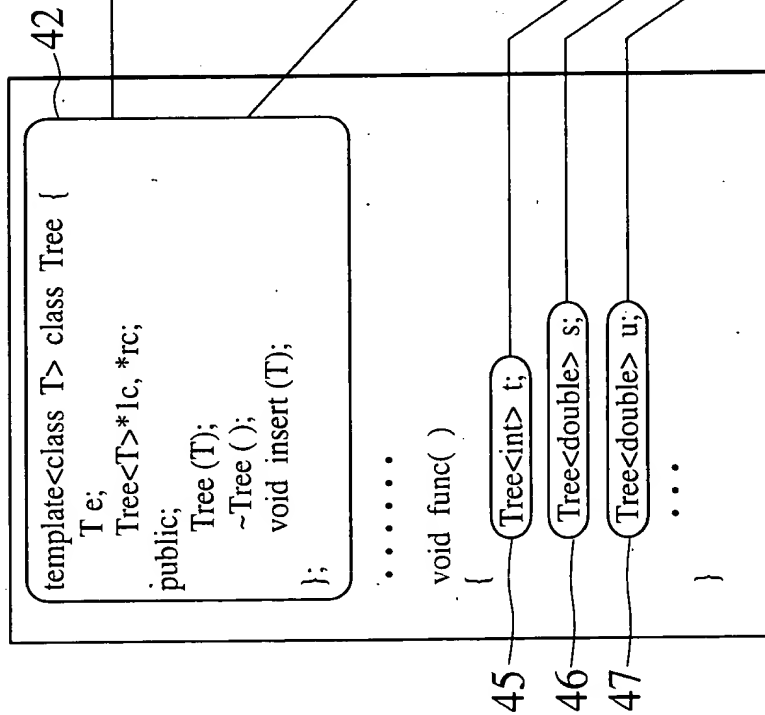
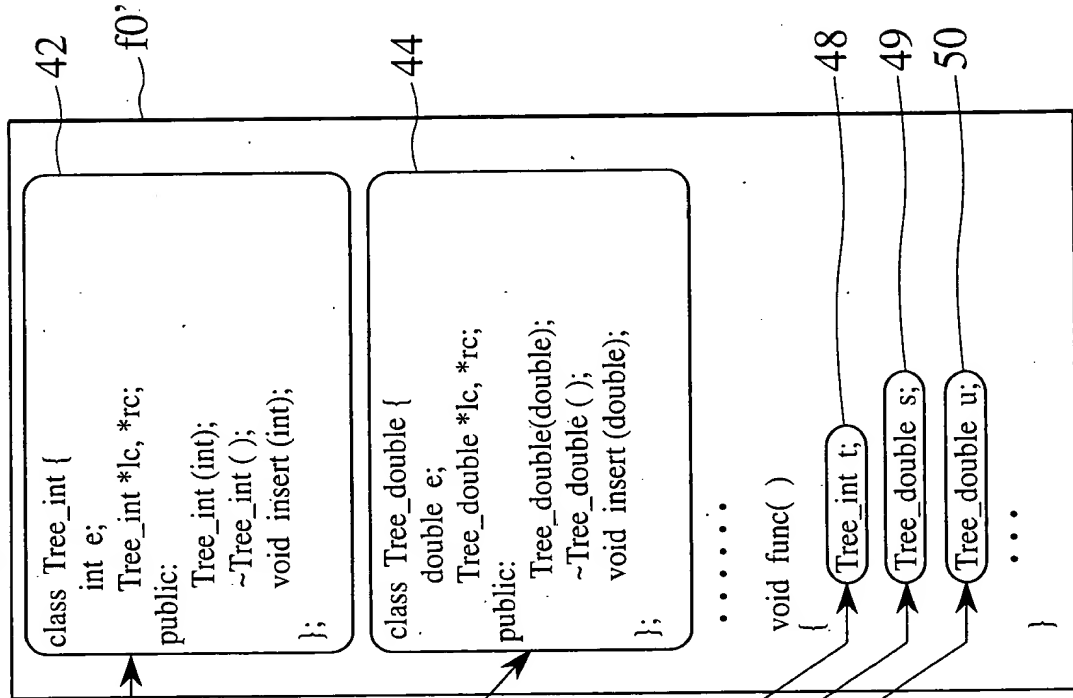


FIG. 16B

OPTIMIZED SOURCE PROGRAM





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FIG. 17A

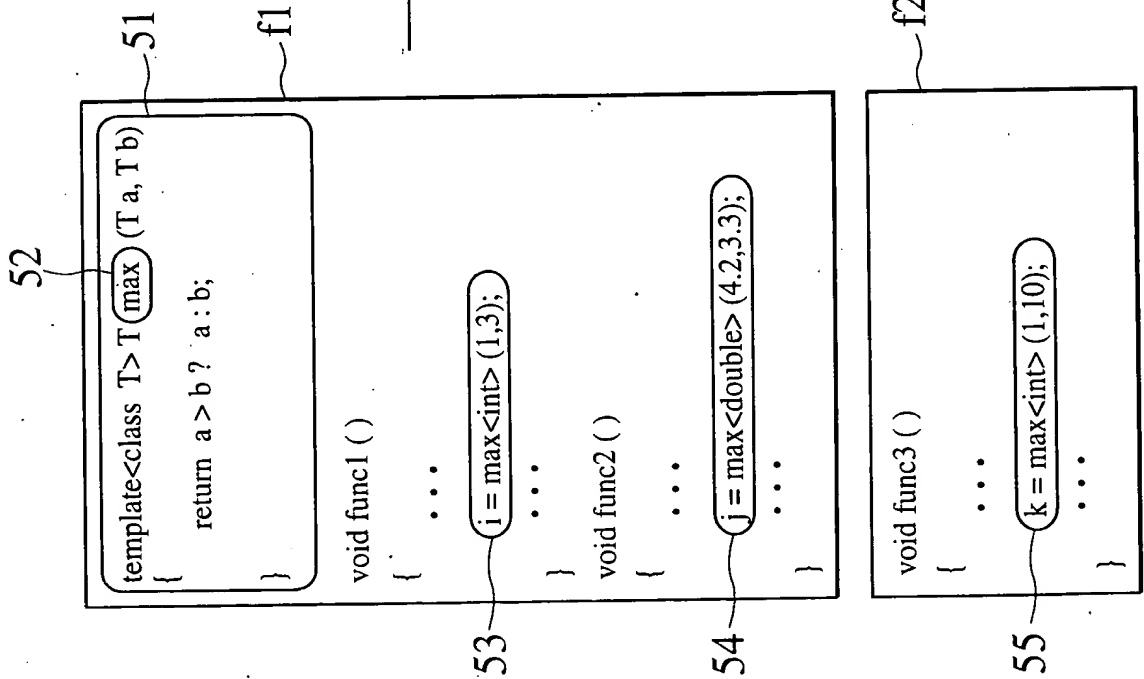


FIG. 17B

MULTIPHASE TYPE DEFINITION TABLE  
(FUNCTION USAGE INFORMATION)

SYMBOL	USAGE FLAG
max<int>	USED
max<double>	USED
max<char>	UNUSED

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FIG. 18A

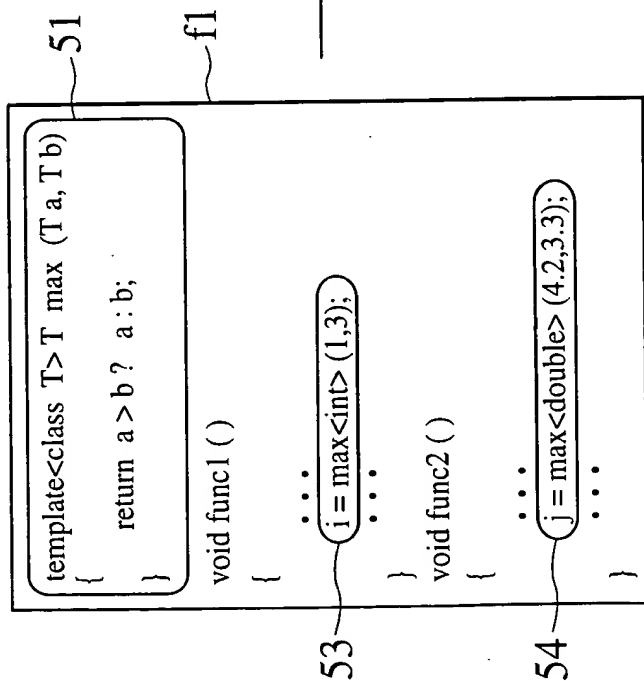


FIG. 18C

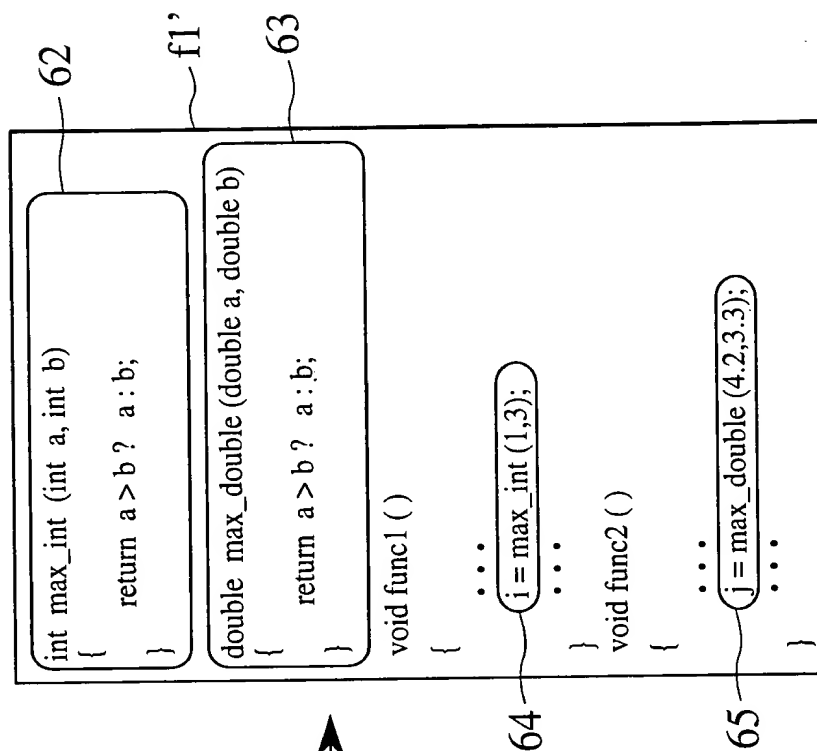


FIG. 18B

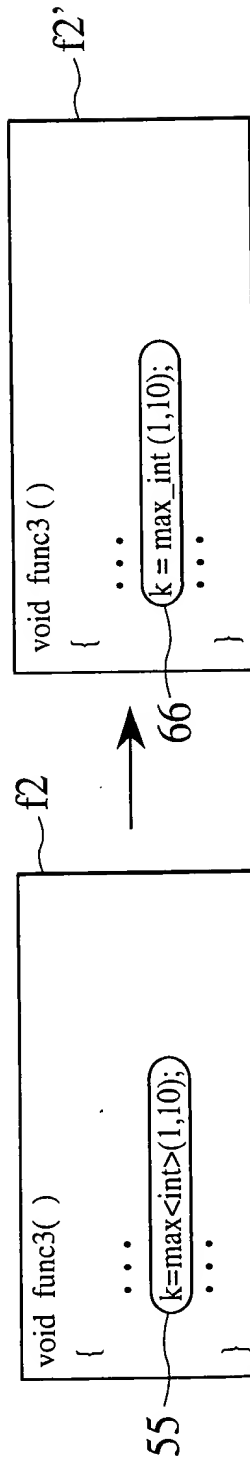


FIG. 19A

PREPROCESSED SOURCE PROGRAM

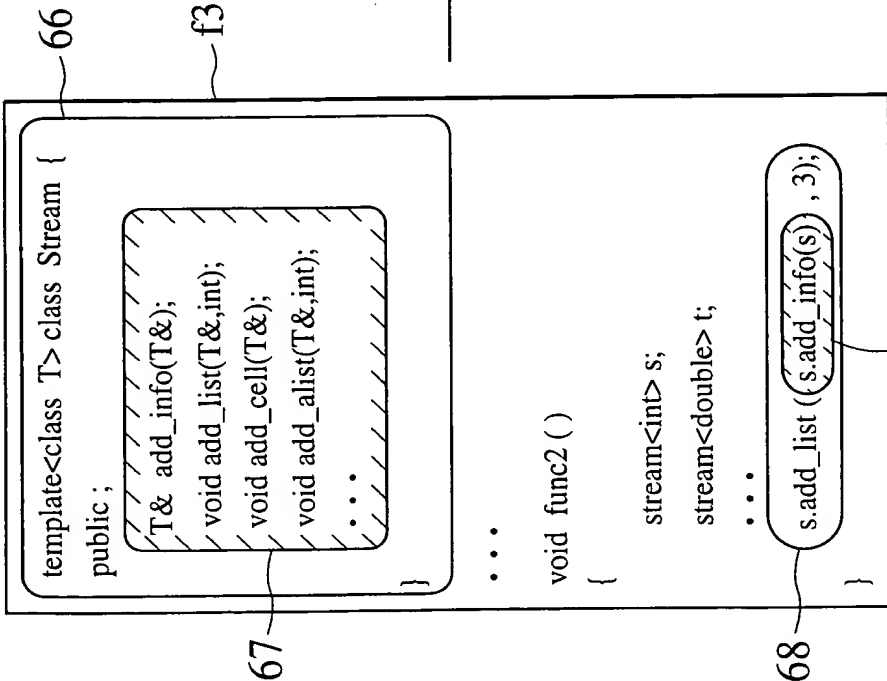


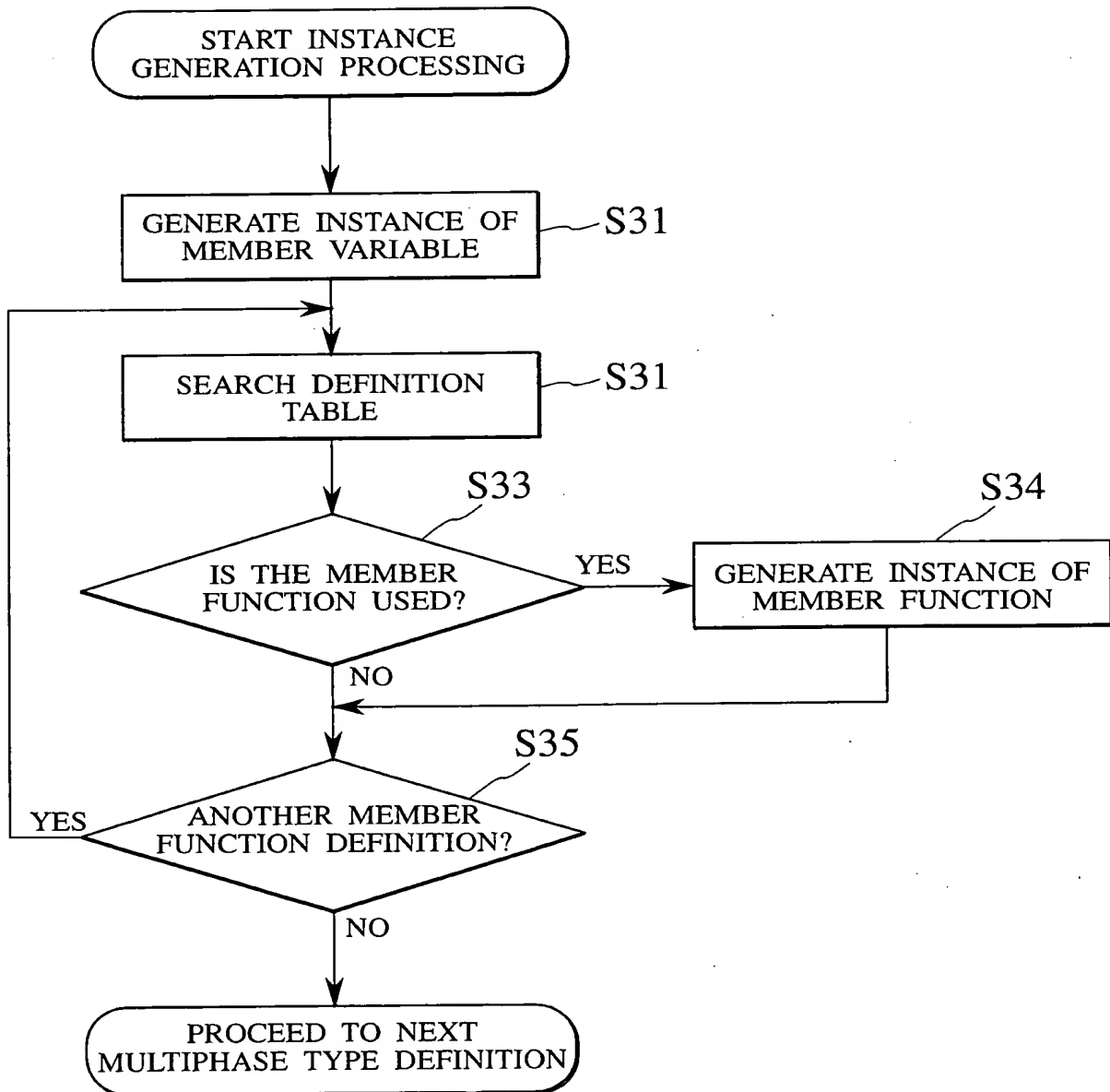
FIG. 19B

MULTIPHASE TYPE DEFINITION TABLE  
(MEMBER FUNCTION INFORMATION)

SYMBOL	USAGE FLAG
Stream<int>::add_info	USED
Stream<int>::add_list	USED
Stream<int>::add_cell	UNUSED
Stream<int>::add_alist	UNUSED
.....	.....
Stream<double>::add_info	UNUSED
Stream<double>::add_list	UNUSED
Stream<double>::add_cell	UNUSED
Stream<double>::add_alist	UNUSED

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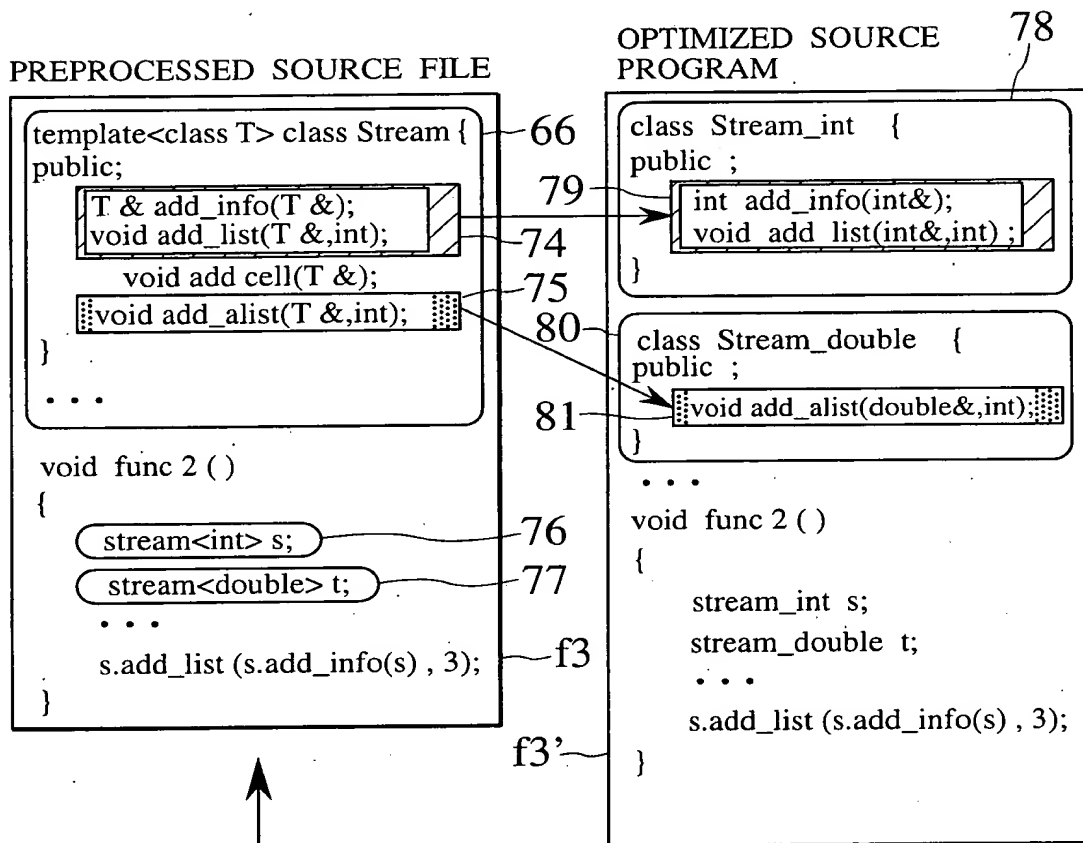
FIG. 20



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FIG. 21

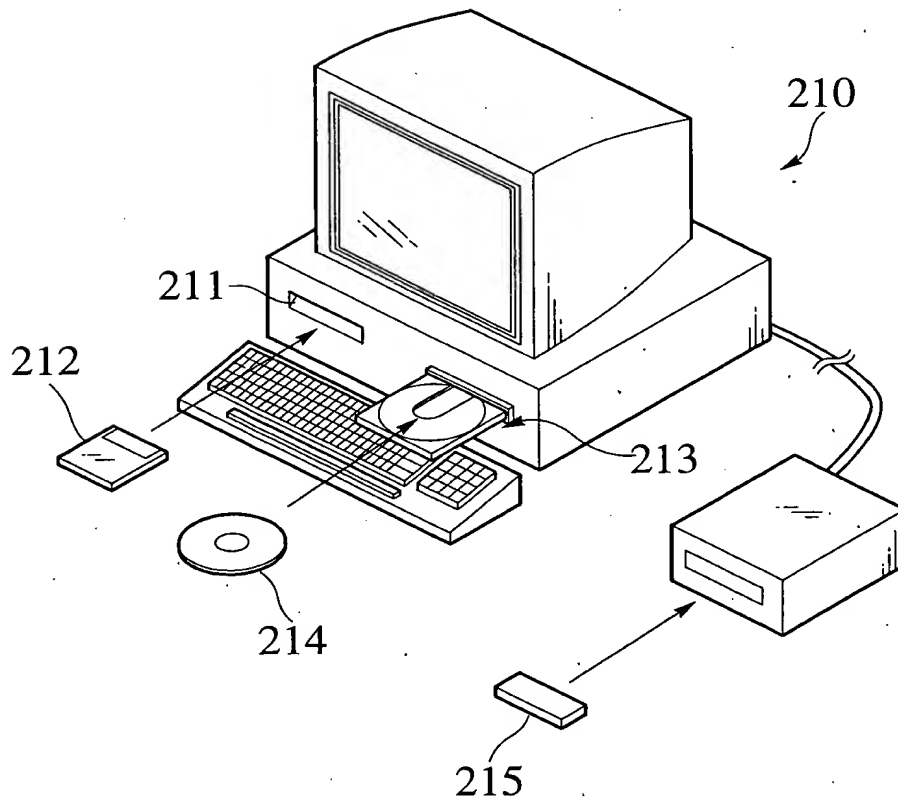


MULTIPHASE TYPE DEFINITION TABLE  
(MEMBER FUNCTION INFORMATION)

SYMBOL	USAGE FLAG
Stream<int>::add_info	USED
Stream<int>::add_list	USED
Stream<int>::add_cell	UNUSED
Stream<int>::add_alist	UNUSED
Stream<int>::add_info	UNUSED
Stream<int>::add_list	UNUSED
Stream<int>::add_cell	UNUSED
Stream<int>::add_alist	USED

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FIG. 22



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